
Appendix I

Required Design Features, Preferred Design
Features, and Suggested Design Features
Regional Mitigation Strategy

APPENDIX I

REQUIRED DESIGN FEATURES, PREFERRED DESIGN FEATURES, AND SUGGESTED DESIGN FEATURES, REGIONAL MITIGATION STRATEGY

REQUIRED DESIGN FEATURES, PREFERRED DESIGN FEATURES, AND SUGGESTED DESIGN FEATURES

Table I.1 provides a list of preferred design features (PDFs) and required design features (RDFs) that are applicable to all alternatives in the resource management plan.

- RDFs are design features required for a specified proposal or project and are often necessary to prevent unnecessary or undue degradation of public land resources. All subsequent line items in Alternative B are RDFs. Citizens' proposal RDFs are the same as Alternative B in all line items.
- PDFs are established guidelines followed by the BLM/USFS to be incorporated into management activities where necessary, appropriate, and/or technically feasible. "Necessary" refers to the need for the PDF given the specifics of a proposal (e.g., it is not "necessary" to apply dust abatement on roads when the soil is sandy and wet). "Appropriate" refers to the wisdom of apply the PDF (e.g., it may not be "appropriate" to locate man camps outside priority habitat because the additional vehicle miles required by a more distant location could be more detrimental to GRSG). A PDF is "technically feasible" when it entails proven, or in some cases, emerging technology.
- Suggested design features (SDFs) apply to locatable minerals.

While the list of PDFs/RDFs/SDFs in **Table I.I** is thorough, the list is not intended to be exhaustive; additional PDFs/RDFs/SDFs could be developed and implemented to help achieve resource objectives. PDFs/RDFs/SDFs include state-of-the-art measures applied on a site-specific basis to avoid, minimize, reduce, rectify, or compensate for adverse environmental or social impacts. They are applied to management actions to help achieve desired outcomes for safe, environmentally responsible resource development by preventing, minimizing, or mitigating adverse impacts and reducing conflicts. PDFs/RDFs/SDFs also can be proposed by project applicants for activities on public lands (e.g., for gas drilling). PDFs/RDFs/SDFs not incorporated into the permit application by the applicant may be considered and evaluated through the environmental review process and incorporated into the use authorization as conditions of approval or ROW stipulations. Standard conditions of approval and ROW stipulations from each LUP would apply to site-specific analysis. Additional PDFs/RDFs/SDFs, conditions of approval, and ROW stipulations could be developed to meet resource objectives based on local conditions and resource specific concerns.

Table I.I
Required Design Features, Preferred Design Features, and Suggested Design Features¹

Alternatives B and C		Alternative D
WEST NILE VIRUS		
All Designated Habitat (ADH)		
The following seven site modifications will minimize exploitation of coal bed natural gas ponds by <i>Culex tarsalis</i>:		
1	RDF (ADH) Increase the size of ponds to accommodate a greater volume of water than is discharged. This will result in un-vegetated and muddy shorelines that breeding <i>Cx. tarsalis</i> avoid (De Szalay and Resh 2000). This modification may reduce <i>Cx. tarsalis</i> habitat but could create larval habitat for <i>Culicoides sonorensis</i> , a vector of blue tongue disease, and should be used sparingly (Schmidtman et al. 2000). Steep shorelines should be used in combination with this technique whenever possible (Knight et al. 2003).	Same as Alternative B for energy-related water disposal. PDF (ADH) When authorizing new ponds for watering livestock, evaluate the proposed design for features that reduce the potential for creating mosquito breeding habitat in conjunction with features that make the pond fit for the purpose for which it is intended.
2	RDF (ADH) Build steep shorelines to reduce shallow water (>60 cm) and aquatic vegetation around the perimeter of impoundments (Knight et al. 2003). Construction of steep shorelines also will create more permanent ponds that are a deterrent to colonizing mosquito species like <i>Cx. tarsalis</i> which prefer newly flooded sites with high primary productivity (Knight et al. 2003).	Same as line 1.

Table I.1
Required Design Features, Preferred Design Features, and Suggested Design Features¹

Alternatives B and C		Alternative D
3	RDF (ADH) Maintain the water level below that of rooted vegetation for a muddy shoreline that is unfavorable habitat for mosquito larvae. Rooted vegetation includes both aquatic and upland vegetative types. Avoid flooding terrestrial vegetation in flat terrain or low lying areas. Aquatic habitats with a vegetated inflow and outflow separated by open water produce 5-10 fold fewer Culex mosquitoes than completely vegetated wetlands (Walton and Workman 1998). Wetlands with open water also had significantly fewer stage III and IV instars which may be attributed to increased predator abundances in open water habitats (Walton and Workman 1998).	Same as line 1.
4	RDF (ADH) Construct dams or impoundments that restrict down slope seepage or overflow by digging ponds in flat areas rather than damming natural draws for effluent water storage, or lining constructed ponds in areas where seepage is anticipated (Knight et al. 2003).	Same as line 1.
5	RDF (ADH) Line the channel where discharge water flows into the pond with crushed rock, or use a horizontal pipe to discharge inflow directly into existing open water, thus precluding shallow surface inflow and accumulation of sediment that promotes aquatic vegetation.	Same as line 1.
6	RDF (ADH) Line the overflow spillway with crushed rock, and construct the spillway with steep sides to preclude the accumulation of shallow water and vegetation.	Same as line 1.
7	RDF (ADH) Fence pond site to restrict access by livestock and other wild ungulates that trample and disturb shorelines, enrich sediments with manure and create hoof print pockets of water that are attractive to breeding mosquitoes.	Same as line 1.
FLUID MINERAL DEVELOPMENT		
Fluid Mineral Roads		
Priority Habitat		
8	RDF (ADH) Design roads to an appropriate standard no higher than necessary to accommodate the intended purpose.	Same as Alternative B.

Table I.1
Required Design Features, Preferred Design Features, and Suggested Design Features¹

Alternatives B and C		Alternative D
9	RDF (P) Locate roads to avoid important areas and habitats.	PDF (P)
10	RDF (P) Coordinate road construction and use among ROW holders.	Same as Alternative B.
11	RDF (P) Construct road crossing at right angles to ephemeral drainages and stream crossings.	PDF (P)
12	RDF (P) Establish speed limits on BLM/USFS system roads to reduce vehicle/wildlife collisions or design roads to be driven at slower speeds.	PDF (P)
13	RDF (P) Establish trip restrictions (Lyon and Anderson 2003) or minimization through use of telemetry and remote well control (e.g., Supervisory Control and Data Acquisition).	PDF (P)
14	RDF (P) Do not issue ROWs to counties on newly constructed energy development roads, unless for a temporary use consistent with all other terms and conditions included in this document.	PDF (P) /Coordinate with counties on transportation management related to GRSG habitat issues.
15	RDF (P) Restrict vehicle traffic to only authorized users on newly constructed routes (use signing, gates, etc.).	PDF (P)
16	RDF (P) Use dust abatement practices on roads and pads.	PDF (P)
17	RDF (P) Close and rehabilitate duplicate roads.	PDF (P)
Fluid Mineral Operations Priority Habitat		
18	RDF (P) Cluster disturbances, operations (fracture stimulation, liquids gathering, etc.), and facilities.	PDF (P)
19	RDF (P) Use directional and horizontal drilling to reduce surface disturbance.	PDF (P)
20	RDF (P) Place infrastructure in already disturbed locations where the habitat has not been restored.	PDF (P)
21	RDF (P) Consider using oak (or other material) mats for drilling activities to reduce vegetation disturbance and for roads between closely spaced wells to reduce soil compaction and maintain soil structure to increase likelihood of vegetation reestablishment following drilling.	PDF (P)
22	RDF (P) Apply a phased development approach with concurrent reclamation.	PDF (P)

Table I.1
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Alternatives B and C		Alternative D
23	RDF (P) Place liquid gathering facilities outside of priority areas. Have no tanks at well locations within priority areas (minimizes perching and nesting opportunities for ravens and raptors and truck traffic). Pipelines must be under or immediately adjacent to the road (Bui et al. 2010).	PDF (P)
24	RDF (P) Restrict the construction of tall facilities and fences to the minimum number and amount needed.	PDF (P)—Restrict the construction of facilities and fences to the minimum number and size necessary.
25	RDF (P) Site and/or minimize linear ROWs to reduce disturbance to sagebrush habitats.	PDF (P)
26	RDF (P) Place new utility developments (power lines, pipelines, etc.) and transportation routes in existing utility or transportation corridors.	PDF (P)
27	RDF (P) Bury distribution power lines.	PDF (P)
28	RDF (P) Corridor power, flow, and small pipelines under or immediately adjacent to roads.	PDF (P)
29	RDF (P) Design or site permanent structures which create movement (e.g. a pump jack) to minimize impacts to GRSG.	PDF (P)
30	RDF (P) Cover (e.g., fine mesh netting or use other effective techniques) all drilling and production pits and tanks regardless of size to reduce GRSG mortality.	PDF (P)—Cover all drilling and production pits and tanks regardless of size with netting or some other BLM-approved cover method.
31	RDF (P) Equip tanks and other above ground facilities with structures or devices that discourage nesting of raptors and corvids.	PDF (P)
32	RDF (P) Control the spread and effects of non-native plant species (Evangelista et al. 2011). (E.g. by washing vehicles and equipment).	PDF (P)—Clean vehicles in a manner that prevents transport of weeds.
33	RDF (P) Use only closed-loop systems for drilling operations and no reserve pits.	PDF (P)
34	RDF (P) Restrict pit and impoundment construction to reduce or eliminate threats from West Nile virus (Doherty 2007).	PDF (P)
35	RDF (P) Remove or re-inject produced water to reduce habitat for mosquitoes that vector West Nile virus. If surface disposal of produced water continues, use the following steps for reservoir design to limit favorable mosquito habitat: <ul style="list-style-type: none"> • Overbuild size of ponds for muddy and 	PDF (P)

Table I.1
Required Design Features, Preferred Design Features, and Suggested Design Features¹

Alternatives B and C		Alternative D
	non-vegetated shorelines.	
	<ul style="list-style-type: none"> • Build steep shorelines to decrease vegetation and increase wave actions. • Avoid flooding terrestrial vegetation in flat terrain or low lying areas. • Construct dams or impoundments that restrict down slope seepage or overflow. • Line the channel where discharge water flows into the pond with crushed rock. • Construct spillway with steep sides and line it with crushed rock. • Treat waters with larvicides to reduce mosquito production where water occurs on the surface. 	
36	RDF (P) Limit noise to less than 10 decibels above ambient measures (20-24 dBA) at sunrise at the perimeter of a lek during active lek season (Patricelli et al. 2010; Blickley et al. <i>In preparation</i>).	PDF (P)
37	RDF (P) Require noise shields when drilling during the lek, nesting, broodrearing, or wintering season.	PDF (P)
38	RDF (P) Fit transmission towers with anti-perch devices (Lammers and Collopy 2007).	Same as Alternative B.
39	RDF (P) Require GRSG-safe fences.	PDF (P)
40	RDF (P) Locate new compressor stations outside priority habitats and design them to reduce noise that may be directed towards priority habitat.	PDF (P)—Locate new compressor stations outside priority habitat. RDF (P)—Design compressor stations and other production equipment so that noise emitted or measured in priority habitat is no reduced to the extent possible.
41	RDF (P) Clean up refuse (Bui et al. 2010).	RDF (P)
42	RDF (P) Locate man camps outside of priority habitats.	PDF (P)
Fluid Minerals Reclamation		
Priority Habitat		
43	RDF (P) Include objectives for ensuring habitat restoration to meet GRSG habitat needs in reclamation practices/sites (Pyke 2011). Address post reclamation management in reclamation plan such that goals and objectives are to protect and improve GRSG habitat needs.	RDF (P)—See Appendix F , Surface Reclamation Plan.

Table I.1
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Alternatives B and C		Alternative D
44	RDF (P) Maximize the area of interim reclamation on long-term access roads and well pads including reshaping, topsoiling, and revegetating cut and fill slopes.	PDF (P)
45	RDF (P) Restore disturbed areas at final reclamation to the pre-disturbance landforms and desired plant community.	PDF (P)—All disturbed areas will be contoured to the original contours or at least to blend with the natural topography. Blending is defined as reducing form, line, shape, and color contrast with the disturbing activity. In visually sensitive areas, all disturbed areas shall be contoured to match the original topography. Matching is defined as reproducing the original topography and eliminating form, line, shape, and color caused by the disturbance as much as possible.
46	RDF (P) Irrigate interim reclamation if necessary for establishing seedlings more quickly.	PDF (P)
47	RDF (P) Utilize mulching techniques to expedite reclamation and to protect soils.	PDF (P)
Fluid Minerals Roads		
General Habitat		
48	RDF (G) Design roads to an appropriate standard no higher than necessary to accommodate their intended purpose.	RDF (ADH) Same as Alternative B.
49	RDF (G) Do not issue ROWs to counties on energy development roads, unless for a temporary use consistent with all other terms and conditions included in this document.	RDF (ADH) Coordinate with counties on transportation management related to GRSG habitat issues.
50	RDF (G) Establish speed limits to reduce vehicle/wildlife collisions or design roads to be driven at slower speeds.	PDF (ADH)
51	RDF (G) Coordinate road construction and use among ROW holders.	RDF (G) Same as Alternative B.
52	RDF (G) Construct road crossing at right angles to ephemeral drainages and stream crossings.	PDF (ADH)
53	RDF (G) Use dust abatement practices on roads and pads.	PDF (ADH)
54	RDF (G) Close and reclaim duplicate roads, by restoring original landform and establishing desired vegetation.	PDF (ADH)
Fluid Minerals Operations		
General Habitat		
55	RDF (G) Cluster disturbances, operations (fracture stimulation, liquids gathering, etc.),	PDF (ADH)

Table I.1
Required Design Features, Preferred Design Features, and Suggested Design Features¹

Alternatives B and C		Alternative D
and facilities.		
56	RDF (G) Use directional and horizontal drilling to reduce surface disturbance.	PDF (ADH)
57	RDF (G) Clean up refuse (Bui et al. 2010).	RDF (ADH)
58	RDF (G) Restrict the construction of tall facilities and fences to the minimum number and amount needed.	PDF (ADH)—Restrict the construction of facilities and fences to the minimum number and size necessary.
59	RDF (G) Cover (e.g., fine mesh netting or use other effective techniques) all drilling and production pits and tanks regardless of size to reduce GRSG mortality.	PDF (ADH)—Cover all drilling and production pits and tanks regardless of size with netting or some other BLM-approved cover method.
60	RDF (G) Equip tanks and other above ground facilities with structures or devices that discourage nesting of raptors and corvids.	PDF (ADH)
61	RDF (G) Use remote monitoring techniques for production facilities and develop a plan to reduce the frequency of vehicle use.	PDF (ADH)
62	RDF (G) Control the spread and effects from non-native plant species. (e.g., by washing vehicles and equipment).	PDF (ADH)—Clean vehicles in a manner that prevents transport of weeds.
63	RDF (G) Restrict pit and impoundment construction to reduce or eliminate augmenting threats from West Nile virus (Doherty 2007).	PDF (ADH)
Fluid Minerals Reclamation		
General Habitat		
64	RDF (G) Include restoration objectives to meet GRSG habitat needs in reclamation practices/sites (Pyke 2011). Address post reclamation management in reclamation plan such that goals and objectives are to enhance or restore GRSG habitat.	RDF (ADH)—See Appendix F , Surface Reclamation Plan.
LOCATABLE MINERALS		
Locatable Minerals Roads		
All Designated Habitat		
65	SDF (ADH)—Design roads to an appropriate standard no higher than necessary to accommodate their intended purpose.	SDF (ADH)—Request operators design roads to an appropriate standard no higher than necessary to accommodate their intended purpose; require as necessary to prevent unnecessary or undue degradation under 43 CFR 3809.
66	SDF (ADH)—Locate roads to avoid important areas and habitats.	SDF (ADH)—Request operators locate roads to avoid important areas and habitats; require as necessary to prevent unnecessary or undue degradation under 43 CFR 3809.

Table I.1
Required Design Features, Preferred Design Features, and Suggested Design Features¹

Alternatives B and C		Alternative D
67	SDF (ADH)—Coordinate road construction and use among ROW holders.	SDF (ADH)—Request ROW holders coordinate road construction and use with other ROW holders; require as necessary to prevent unnecessary or undue degradation under 43 CFR 3809.
68	SDF (ADH)—Construct road crossing at right angles to ephemeral drainages and stream crossings.	SDF (ADH)—Request operators construct road crossing at right angles to ephemeral drainages and stream crossings; require as necessary to prevent unnecessary or undue degradation under 43 CFR 3809.
69	SDF (ADH)—Establish speed limits on BLM/USFS system roads to reduce vehicle/wildlife collisions or design roads to be driven at slower speeds.	SDF (ADH)—Request operators establish speed limits on BLM/USFS system roads to reduce vehicle/wildlife collisions or design roads to be driven at slower speeds; require as necessary to prevent unnecessary or undue degradation under 43 CFR 3809.
70	SDF (ADH)—Do not issue ROWs to counties on mining development roads, unless for a temporary use consistent with all other terms and conditions included in this document.	SDF (ADH)—Coordinate with counties on transportation management related to GRSG habitat issues.
71	SDF (ADH)—Restrict vehicle traffic to only authorized users on newly constructed routes (e. g., use signing, gates, etc.).	SDF (ADH)—Request operators restrict vehicle traffic to only authorized users on newly constructed routes (e.g., use signing, gates, etc.); require as necessary to prevent unnecessary or undue degradation under 43 CFR 3809.
72	SDF (ADH)—Use dust abatement practices on roads and pads.	SDF (ADH)—Request operators use dust abatement practices on roads and pads; require as necessary to prevent unnecessary or undue degradation under 43 CFR 3809.
73	SDF (ADH)—Close and reclaim duplicate roads, by restoring original landform and establishing desired vegetation.	SDF (ADH)—Request operators close and reclaim duplicate roads, by restoring original landform and establishing desired vegetation; require as necessary to prevent unnecessary or undue degradation under 43 CFR 3809.
Locatable Minerals Operations		
All Designated Habitat		
74	SDF (ADH)—Cluster disturbances associated with operations and facilities as close as possible.	SDF (ADH)—Cluster disturbances associated with operations and facilities as close as possible; require as necessary to prevent unnecessary or undue degradation under 43 CFR 3809.
75	SDF (ADH)—Place infrastructure in already disturbed locations where the habitat has not been restored.	SDF (ADH)—Place infrastructure in already disturbed locations where the habitat has not been restored; require as necessary to prevent unnecessary or undue degradation under 43 CFR 3809.

Table I.I
Required Design Features, Preferred Design Features, and Suggested Design Features¹

Alternatives B and C		Alternative D
76	SDF (ADH)—Restrict the construction of tall facilities and fences to the minimum number and amount needed.	SDF (ADH)—Restrict the construction of tall facilities and fences to the minimum number and amount needed; require as necessary to prevent unnecessary or undue degradation under 43 CFR 3809.
77	SDF (ADH) —Site and/or minimize linear ROWs to reduce disturbance to sagebrush habitats.	SDF (ADH)—Site and/or minimize linear ROWs to reduce disturbance to sagebrush habitats; require as necessary to prevent unnecessary or undue degradation under 43 CFR 3809.
78	SDF (ADH)—Place new utility developments (power lines, pipelines, etc.) and transportation routes in existing utility or transportation corridors.	SDF (ADH)—Request that operators place new utility developments (power lines, pipelines, etc.) and transportation routes in existing utility or transportation corridors; require as necessary to prevent unnecessary or undue degradation under 43 CFR 3809.
79	SDF (ADH)—Bury power lines.	SDF (ADH)—Request that operators bury power lines; require as necessary to prevent unnecessary or undue degradation under 43 CFR 3809.
80	SDF (ADH)—Cover (e.g., fine mesh netting or use other effective techniques) all pits and tanks regardless of size to reduce GRSG mortality.	SDF (ADH)—Request that operators cover all pits and tanks regardless of size using fine mesh netting or other effective techniques to reduce GRSG mortality; require as necessary to prevent unnecessary or undue degradation under 43 CFR 3809.
81	SDF (ADH)—Equip tanks and other above ground facilities with structures or devices that discourage nesting of raptors and corvids.	SDF (ADH)—Request operators equip tanks and other above ground facilities with structures or devices that discourage nesting of raptors and corvids; require as necessary to prevent unnecessary or undue degradation under 43 CFR 3809.
82	SDF (ADH)—Control the spread and effects of non-native plant species (Gelbard and Belnap 2003; Bergquist et al. 2007).	SDF (ADH)—Request operators control the spread and effects of non-native plant species (Gelbard and Belnap 2003; Bergquist et al. 2007); require as necessary to prevent unnecessary or undue degradation under 43 CFR 3809.
83	SDF (ADH)—Restrict pit and impoundment construction to reduce or eliminate threats from West Nile virus (Doherty 2007).	SDF (ADH)—Request operators restrict pit and impoundment construction to reduce or eliminate threats from West Nile virus (Doherty 2007); require as necessary to prevent unnecessary or undue degradation under 43 CFR 3809.
84	SDF (ADH)—Remove or re-inject produced water to reduce habitat for mosquitoes that vector West Nile virus. If surface disposal of produced water continues, use the following steps for reservoir design to limit favorable mosquito habitat:	SDF (ADH)—Request that operators adhere to the PDF/RDF provisions in this table's Section on West Nile Virus; require adherence as necessary to prevent unnecessary or undue degradation under 43 CFR 3809.

Table I.1
Required Design Features, Preferred Design Features, and Suggested Design Features¹

Alternatives B and C		Alternative D
	<ul style="list-style-type: none"> • Overbuild size of ponds for muddy and non-vegetated shorelines. • Build steep shorelines to decrease vegetation and increase wave actions. • Avoid flooding terrestrial vegetation in flat terrain or low lying areas. • Construct dams or impoundments that restrict down slope seepage or overflow. • Line the channel where discharge water flows into the pond with crushed rock. • Construct spillway with steep sides and line it with crushed rock. • Treat waters with larvicides to reduce mosquito production where water occurs on the surface. 	
85	SDF (ADH)—Require GRSG-safe fences around sumps.	SDF (ADH)—Request operators install GRSG -safe fences around sumps; require as necessary to prevent unnecessary or undue degradation under 43 CFR 3809.
86	SDF (ADH)—Clean up refuse (Bui et al. 2010).	SDF (ADH)—Require operators to clean up refuse (Bui et al. 2010) so as to prevent unnecessary or undue degradation under 43 CFR 3809.
87	SDF (ADH)—Locate man camps outside of priority GRSG habits.	SDF (ADH)—Request that operators locate man camps outside priority habitat; require as necessary to prevent unnecessary or undue degradation under 43 CFR 3809.
Locatable Minerals Reclamation All Designated Habitat		
88	SDF (ADH)—Include restoration objectives to meet GRSG habitat needs in reclamation practices/sites. Address post reclamation management in reclamation plan such that goals and objectives are to protect and improve GRSG habitat needs.	SDF (ADH)—See Appendix F , Surface Reclamation Plan.
89	SDF (ADH)—Maximize the area of interim reclamation on long-term access roads and well pads including reshaping, topsoiling, and revegetating cut and fill slopes.	SDF (ADH) No similar action. (Interim Reclamation is a fluid mineral term that does not apply to locatable minerals.)
90	SDF (ADH)—Restore disturbed areas at final reclamation to pre-disturbance landform and desired plant community.	SDF (ADH)—Request operators' reclamation plans to target pre-disturbance landform and desired plant community vegetation; require as necessary to prevent unnecessary or undue degradation under 43 CFR 3809.
91	SDF (ADH) —Irrigate interim reclamation as necessary during dry periods.	(ADH) No similar action. (Interim Reclamation is a fluid mineral term that does not apply to locatable

Table I.I
Required Design Features, Preferred Design Features, and Suggested Design Features¹

Alternatives B and C		Alternative D
		minerals.)
92	SDF (ADH)—Utilize mulching techniques to expedite reclamation.	SDF (ADH)—Request operators use mulching techniques to expedite reclamation; require as necessary to prevent unnecessary or undue degradation under 43 CFR 3809.
93	SDF (ADH)—Do not issue ROWs to counties on mining development roads, unless for a temporary use consistent with all other terms and conditions included in this document.	SDF (ADH)—Coordinate with counties on transportation management related to GRSG habitat issues.
FIRE MANAGEMENT		
Fire Management—Fuels Management		
All Designated Habitat		
94	RDF (ADH) Where applicable, design fuels treatment objectives to protect existing sagebrush ecosystems, modify fire behavior, restore native plants, and create landscape patterns which most benefit GRSG habitat.	PDF (ADH)—Where applicable, design fuels treatment objective to protect existing sagebrush ecosystems, modify fire behavior, restore native plants, and create landscape patterns to address other values-at-risk.
95	RDF (ADH) Provide training to fuels treatment personnel on GRSG biology, habitat requirements, and identification of areas utilized locally.	PDF (ADH)
96	RDF (ADH) Use fire prescriptions that minimize undesirable effects on vegetation or soils (e.g., minimize mortality of desirable perennial plant species and reduce risk of hydrophobicity).	PDF (ADH)
97	RDF (ADH) Ensure proposed sagebrush treatments are planned with interdisciplinary input from BLM, USFS, and /or state wildlife agency biologist and that treatment acreage is conservative in the context of surrounding GRSG seasonal habitats and landscape.	RDF (ADH)
98	RDF (ADH) Where appropriate, ensure that treatments are configured in a manner (e.g., strips) that promotes use by GRSG (see Connelly et al. 2000).	RDF (ADH)
99	RDF (ADH) Where applicable, incorporate roads and natural fuel breaks into fuel break design.	RDF (ADH)
100	RDF (ADH) Power-wash all vehicles and equipment involved in fuels management activities prior to entering the area to minimize the introduction of undesirable and/or invasive plant species.	PDF (ADH)

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Required Design Features, Preferred Design Features, and Suggested Design Features¹

	Alternatives B and C	Alternative D
I01	RDF (ADH) Design vegetation treatment in areas of high fire frequency to facilitate firefighter safety, reduce the risk of extreme fire behavior; reduce the potential of acres burned; and to reduce the fire risk to key GRSG habitats. Additionally, develop maps for GRSG habitat which spatially display current fuels treatment opportunities for suppression resources.	RDF (ADH)
I02	RDF (ADH) Give priority for implementing specific GRSG habitat restoration projects in annual grasslands first to sites which are adjacent to or surrounded by GRSG key habitats. Annual grasslands are second priority for restoration when the sites not adjacent to key habitat, but within 2 miles of key habitat. The third priority for annual grasslands habitat restoration projects are sites beyond 2 miles of key habitat. The intent is to focus restoration outward from existing, intact habitat.	PDF (ADH)
I03	RDF (ADH)As funding and logistics permit, restore annual grasslands to a species composition characterized by perennial grasses, forbs, and shrubs.	PDF (ADH)—Restore annual grasslands to a species composition characterized by perennial grasses, forbs, and shrubs.
I04	RDF (ADH) Emphasize the use of native plant species, recognizing that non-native species may be necessary depending on the availability of native seed and prevailing site conditions.	PDF (ADH)
I05	RDF (ADH) Remove standing and encroaching trees within at least 100 meters of occupied GRSG leks and other habitats (e.g., nesting, wintering, and brood rearing) to reduce the availability of perch sites for avian predators, as appropriate, and resources permit.	PDF (ADH)
I06	RDF (ADH) Protect wildland areas from wildfire originating on private lands, infrastructure corridors, and recreational areas.	RDF (ADH)—Prioritize suppression immediately after firefighter and public safety commensurate with the values-at-risk.
I07	RDF (ADH)Reduce the risk of vehicle or human-caused wildfires and the spread of invasive species by planting perennial vegetation (e.g., green-strips) paralleling road ROW.	PDF (ADH)

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Alternatives B and C		Alternative D
108	RDF (ADH) Strategically place and maintain pre-treated strips/areas (e.g., mowing, herbicide application, and strictly managed grazed strips) to aid in controlling wildfire should wildfire occur near key habitats or important restoration areas (such as where investments in restoration have already been made).	PDF (ADH)
Fire Management All Designated Habitat		
109	RDF (ADH) Develop state-specific GRSG reference information and resource materials containing maps, a list of resource advisors, contact information, local guidance, and other relevant information. Adequately document fire operation activities in GRSG habitat for potential follow-up coordination activities.	RDF (ADH)—Develop state-specific GRSG reference and resource materials containing maps, a list of resource advisors, contact information, local guidance, and other relevant information. These state-specific GRSG reference and resource materials are for internal use only.
110	RDF (ADH) Provide localized maps to dispatch offices and extended attack incident commanders for use in prioritizing wildfire suppression resources and designing suppression tactics.	RDF (ADH)
111	RDF (ADH) Assign a GRSG resource advisor to all extended attack fires in or near key GRSG habitat areas. Prior to the fire season, provide training to GRSG resource advisors on wildfire suppression organization, objectives, tactics, and procedures to develop a cadre of qualified individuals.	PDF (ADH)—Prior to the fire season, provide training to GRSG resource advisors on wildfire suppression organization, objectives, tactics, and procedures to develop a cadre of qualified individuals.
112	RDF (ADH) On critical fire weather days, pre-position additional fire suppression resources to optimize a quick and efficient response in GRSG habitat areas.	PDF (ADH)—Pre-position fire suppression resources based on all resource values-at-risk.
113	RDF (ADH) During periods of multiple fires, ensure line officers are involved in setting priorities.	RDF (ADH)
114	RDF (ADH) Locate wildfire suppression facilities (i.e., base camps, spike camps, drop points, staging areas, and heli-bases) in areas where physical disturbance to GRSG habitat can be minimized. These include disturbed areas, grasslands, near roads/trails or in other areas where there is existing disturbance or minimal sagebrush cover. As appropriate, utilize existing fuel breaks, such as roads or discrete changes in fuel type, as control lines	PDF (ADH)

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Alternatives B and C		Alternative D
in order to minimize fire spread.		
I15	RDF (ADH) Power-wash all firefighting vehicles, to the extent possible, including engines, water tenders, personnel vehicles, and ATVs prior to deploying in or near GRSG habitat areas to minimize noxious weed spread.	PDF (ADH)
I16	RDF (ADH) Minimize unnecessary cross-country vehicle travel during fire operations in GRSG habitat.	RDF (ADH)—Eliminate unnecessary cross-country vehicle travel during fire operations in GRSG habitat.
I17	RDF (ADH) Minimize burnout operations in key GRSG habitat areas by constructing direct fire line whenever safe and practical to do so.	PDF (ADH)
I18	RDF (ADH) Utilize retardant and mechanized equipment to minimize burned acreage during initial attack.	PDF (ADH)
I19	RDF (ADH) As safety allows, conduct mop-up where the black adjoins unburned islands, dog legs, or other habitat features to minimize sagebrush loss.	PDF (ADH)

¹ All Designated Habitat (ADH) includes Priority (P), General (G), and Connectivity (C) habitat.

REGIONAL MITIGATION STRATEGY

Mitigation strategies, which take into account the mitigation hierarchy (avoid, minimize, restore, offset), are an important tool for ensuring the BLM/FS meet their greater sage-grouse resource objectives while continuing to honor our multiple-use mission. The BLM and FS priority is to mitigate impacts to an acceptable level onsite, to the extent practical, through avoidance (not taking a certain action or parts of an action), minimization (limiting the degree or magnitude of the action and its implementation), rectification (repairing, rehabilitating, or restoring the affected environment), or reduction of impacts over time (preservation and maintenance operations during the life of the action). While mitigating impacts for proposed projects to an acceptable level onsite is typically analyzed and determined through site-specific, implementation-level NEPA documents and their commensurate decision documents, the analysis and mitigation for project level activities will be tiered to the analysis and mitigation proposed throughout each of the action alternatives in this Amendment.

For those impacts that cannot be sufficiently avoided or minimized onsite, the BLM/FS must ensure implementation of effective measures to offset (or compensate for) such impacts and to maintain or improve the viability of sage grouse habitat and populations over time, as described in the Service's Conservation Objectives Team Report. Regional mitigation may be a necessary component for many large renewable and nonrenewable energy development projects as well as many smaller projects with cumulative effects on the greater sage-grouse and its habitat.

Any regional mitigation strategy for BLM managed lands will comply with BLM's **Regional Mitigation** Manual Section (MS) 1794, which provides policies, procedures, and instructions for:

1. Adopting a regional approach to planning and implementing mitigation, including pre-identifying potential mitigation sites, projects, and measures; and
2. Identifying the type of mitigation that is needed to compensate for impacts to resources or values caused by a land use authorization.

It is important to note that any mitigation strategy must include the cooperation and coordination of appropriate and pertinent federal, state and local land and resource management agencies across the landscape. The final strategy adopted and implemented within a landscape will be dependent on the unique resources and values of the regional landscape and the mitigation strategies and resources contributed by the regional partners. It is important to acknowledge that the State government working with the BLM/FS as a Cooperating Agency on this land use plan amendment may have already completed, or is currently working on, statewide mitigation strategies. The BLM/FS will continue to work with and support those State government efforts.

The BLM will establish a Mitigation Implementation Team for each of the six WAFWA Management Zones in the West, following the completion of each of the 15 sub-regional EISs that are associated with the National Greater Sage-Grouse Planning Strategy. The planning area presented in this sub-regional EIS lies within the Northwest Colorado WAFWA Management Zones. The teams are responsible for developing a Mitigation Strategy consistent with BLM MS 1794, as appropriate. The teams will coordinate recommended mitigation strategies between RMP planning areas, WAFWA management zones, and local and state jurisdictions for mitigation consistency, where appropriate.

These implementation teams will be responsible for implementing BLM MS 1794, and making recommendations regarding the following items related to compensatory mitigation:

1. A structure for determining appropriate mitigation, including impact (debit) and benefit (credit) calculation methods, mitigation ratios, mitigation "currency" (i.e., numbers of birds, acres, etc.), location, and performance standards options by considering local and regional, mitigation options,
2. How to resolve mitigation oriented discrepancies that arise within the WAFWA Management Zone or between Zones,
3. the application and the holding and disposition of any mitigation funds,
4. the most appropriate mitigation for impacts from a given land use authorization and type of seasonal habitat impacted,
5. Prioritization of potential mitigation sites, projects, and measures, as guided by conservation strategies (e.g. PACs, priority habitat areas), and
6. Reviewing mitigation monitoring reports and analyzing and reporting on project effectiveness, corrective measures / adaptive management (where required), and cumulative effects of mitigation actions at the PAC and the WAFWA zone.

1 These WAFWA Management Zone Implementation Teams will function as inter-disciplinary
2 teams (IDTs) composed of BLM, FS, FWS and state fish and game agencies. The Mitigation
3 Implementation Team will make recommendations to the BLM Authorized Officer. If the
4 recommendations are rejected for any reason, the Mitigation Implementation Team will be re-
5 convened to develop additional recommendations.

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